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**A CRITIQUE OF THE USE OF EXISTENCE VALUES
IN THE EVALUATION OF WATER RESOURCES
DEVELOPMENT PROJECTS**

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**A CRITIQUE OF THE USE OF EXISTENCE VALUES
IN THE EVALUATION OF WATER RESOURCE DEVELOPMENT PROJECTS**

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PREFACE

This report was prepared as part of the U.S. Army Corps of Engineers (COE) Evaluation and Formulation of Environmental Projects Work Unit, within the Planning Methodologies Research Program. Mr. William Hansen and Mr. Darrell Nolton of the COE Water Resources Support Center (WRSC), Institute for Water Resources (IWR), manage this Work Unit under the general supervision of Mr. Michael Krouse, Chief, Technical Analysis and Research Division; Mr. Kyle Schilling, Director, IWR; and Mr. Kenneth Murdock, Director, WRSC. Mr. Robert Daniel, Chief of the Economic and Social Analysis Branch (CECW-PD), and Mr. Brad Fowler, Economist (CECW-PD) served as Technical Monitors for Headquarters, COE.

Dr. James L. Regens, Freeport-McMoRan Professor of Environmental Policy, Tulane University was the principal investigator and author. The work was performed under the auspices of the U.S. Army Research Office's Scientific Services Program, Contract No. DAAI 03-91-C-0034. The views, opinions and findings contained in this report are those of the author and should not be construed as an official Department of the Army position, policy, or decision.

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INTRODUCTION

Economic valuations of the anticipated beneficial and adverse impacts of water resource development projects typically are an integral component of the pre-authorization planning process. Within the U.S. Army Corps of Engineers (USACE), new authorities are providing enhanced opportunities as well as requirements to foster environmentally sustainable development. Emphasis on incorporating the magnitude of shifts in the value of environmentally-oriented goods and services into project decision making, however, gives rise to the need for adequate techniques for measuring potential benefits and costs in monetary terms in order to identify the alternative involving the least net cost or greatest net benefit to society. That is, what is the value to be attached to a given level of improvement in environmental quality or to preserving the existing level without additional deterioration?

Economic valuation involves consideration of the direct use of environmental resources through such activities as recreation and commercial fishing. It also potentially involves implicit, if not explicit, consideration of non-use or non-consumptive values attributable to environmental amenities, such as the intrinsic beauty of the Grand Canyon. Krutilla (1967: 781), for example, noted that numerous individuals "obtain satisfaction from mere knowledge that part of wilderness North America remains" even though the vast majority will never visit those areas, and he proposed formal evaluation of such satisfaction (see also Krutilla and Fisher 1975). This paper

provides an assessment of the state-of-the-art for measuring existence values and an appraisal of appropriate roles for the concept in USACE decision making.

EXISTENCE VALUES AND BENEFIT-COST ANALYSIS

When considering techniques for economic valuation, it is important to remember that environmental quality is a public good which may consist of consumptive and non-consumptive components. The non-consumptive or non-use component of environmental benefits commonly are viewed as being the intrinsic or inherent value that individuals attach to environmental quality, since individuals acquire utility without consumption (Brookshire et al 1983). Conceptually, existence values represent the willingness of individuals to pay for the knowledge that environmental amenities or natural resources exist (Mitchell and Carson 1989).

Enjoyment of the existence value attributable to non-consumptive public goods normally is assumed to be non-rival and nonexclusive. That is, numerous individuals may avail themselves of those benefits without reducing their accessibility to others, since the goods are not actually used. As a result, unlike the consumptive goods component of environmental benefits, the non-consumptive component lacks market price analogues which can be measured indirectly using the travel-cost or hedonic price methods (Clawson and Knetsch 1966; Rosen 1974). Consequently, it is a major analytical challenge to infer each individual's willingness to pay for the existence value of non-consumptive environmental goods with reasonable precision (Loomis 1988;

Madariaga and McConnell 1987; Smith 1987; Cummings et al 1986; Fisher and Raucher 1984).

How should existence values be addressed in benefit-cost analysis? One answer is to ignore them, either because data are not available or reliable enough, or because it is not clear how to adequately measure them. On the other hand, the fact that benefits are non-consumptive or intangible does not automatically mean they are inconsequential in terms of individual preferences. For example, several recent USACE Feasibility Reports have included existence values in their economic analysis. In addition, in 1989, the U.S. Court of Appeals for the District of Columbia endorsed the inclusion of existence values in regulations for natural resource damage assessments promulgated by the U.S. Department of the Interior under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended. In another view, however, in a memorandum to the Washington Level Review Center (Daniel 1992), the Chief of USACE's Economic and Social Analysis Branch asserted:

If anything, more stress should be placed on the inapplicability of existence value for the vast majority, if not the entirety, of the Corps program, including environmental restoration ... estimation of valid existence benefits is fraught with difficulties ... Estimation of existence, and related values such as option and bequest, may be applicable and be more likely to gain acceptance in the case of very rare or unique resources. Existence value estimates may also shed light in a very general way on the value of environments. Extension of the concept to traditional water resources or typical environmental restoration projects is not appropriate.

This reflects the long-standing reluctance of some economists to incorporate the measurement of non-use values in benefit-cost analysis, especially when they are

conceptualized as intangibles or not specifically being associated with rare or unique resources. To assess the relative merits of these positions, it is worth considering the assumptions underlying the case against, and the case for, using existence values in benefit-cost analysis.

THE CASE AGAINST USING EXISTENCE VALUES

The argument against using existence values in benefit-cost analysis rests on several points. First, it may be difficult to derive valid, reliable measures of existence values (Rosenthal and Nelson 1992). Second, the concept of existence values incorporates elements based on non-efficiency criteria whose inclusion in benefit-cost analysis is problematic (Brookshire et al 1986). Finally, because fundamental disagreements can emerge in terms of social preferences for environmental or natural resources (Nelson 1991), the inclusion of existence value estimates in benefit-cost analysis can be misguided since normative disparities cannot be resolved with formal analytical methods.

Since the monetary increments are derived by the contingent valuation method using survey techniques to elicit willingness to pay measures (Regens 1991; Brookshire and Crocker 1981), critics assert that a variety of potential sources of bias can affect the reliability and/or validity of existence values (Rowe and Chestnut 1983). First, the way in which questions are framed or worded can influence responses. Research demonstrates the starting point or initial bid can influence final bids if the survey instrument employs the iterative bidding technique. Aggregate existence

values may vary over a substantial range due to fluctuation in the starting point. Second, strategic bias may tempt respondents to increase or decrease their stated existence value rather than offer their actual valuation, if such strategic behavior in terms of willingness-to-pay enhances the likelihood of achieving a preferred outcome. For example, individuals who want more wilderness may inflate their expressed existence values to generate net benefits. Third, as is true for any survey effort, information bias can distort existence values when respondents lack adequate information with which to provide an informed response. Fourth, existence values may be distorted due to hypothetical bias when individuals are confronted with ill-conceived or contrived choices.

In essence, benefit-cost analysis provides an analytical framework for organizing arguments for and against discrete options in terms of their relative economic efficiency (Mishan 1982). As such, it can illuminate implicit, and possibly explicit, tradeoffs among preferences for tangible benefits. However, if the array of environmental amenities that existence values encompass is relatively open-ended and vaguely defined, then it becomes prudent to classify existence values as intangible benefits which cannot be assigned a monetary value. In fact, existence values do seem to be difficult to isolate as well as differentiate from option or legacy values (Carson and Navarro 1988; Johannson 1987). As a result, the inclusion of benefits attributable to existence value estimates is problematic.

THE CASE FOR USING EXISTENCE VALUES

The case for including existence values rests on both conceptual and methodological arguments (Kopp 1992). Consider first, the conceptual argument. At the conceptual level, even if existence values are intangible benefits, proponents of using existence values maintain the fact that they may be qualitative does not mean they are unimportant to the individuals holding such preferences. Similarly, while altruism or social ideologies may be an underlying motivation for those preferences, to ignore non-consumptive values because of their origins does not mean those values are irrelevant to shaping choice (Cory and Saliba 1987). Thus, if individuals have non-use or collective consumption preferences for environmental amenities (Weisbrod 1964), conclusions may be biased or misleading when those preferences are excluded from analysis.

Conceding the conceptual point, that individuals possess normative preferences for intangible benefits including existence, option or legacy values, does not negate automatically the methodological concerns vis a vis operationalizing non-use values. That is, if non-use values are going to be incorporated into benefit-cost analysis, they must be defined in a way which permits their measurement. Moreover, when measured, it is necessary to avoid intertwining the various elements of non-consumptive benefits or engaging in multiple-counting in calculating their aggregate monetary value.

Is it possible to derive valid, reliable data on the magnitude of existence values? In essence, addressing this methodological concern in a satisfactory manner is central

to incorporating existence values into benefit-cost analysis. The answer seems to be: "It depends." Two issues emerge: (1) the extent to which the state-of-the-art of contingent valuation techniques is sufficient to cope with potential sources of bias; and (2) the extent to which a "pure" existence value increment of non-use value can be measured.

It does not seem naive to suggest that the potential sources of bias can be coped with through well-designed applications of the contingent valuation method (Mitchell and Carson 1989). While it may not be possible to eliminate all non-stochastic biases, careful design of the survey instrument, coupled with a probability sample to select the respondents, should permit minimization and control of such problems. And, at least in terms of option values and by implication existence values, recent studies illustrate its utility for measuring non-use benefits (Desvousges et al 1987; Daubert and Young 1981).

However, it seems reasonable to be cautious about our current capability to separate unambiguous existence values from other non-use values. Because eliciting answers to questions about non-use values may stimulate symbolic rather than cognitive responses, it may be difficult, if not impossible, to disentangle a "pure" existence value component unless the environmental good is characterized broadly. For example, if we are concerned with generalized preferences for wetlands rather than a specific tract, then the existence value associated with this symbolic issue may be captured. The results may be more suspect if respondents are quizzed about the

existence value of a specific wetland, unless the respondents are well-informed about the individual wetland.

IMPLICATIONS FOR CORPS DECISION MAKING

Given the current state-of-knowledge, a balanced perspective suggests that the use of existence values for benefit-cost analysis of environmental amenities or natural resources should not be rejected automatically. It is clear, however, that the incorporation of existence values specifically, or non-use values in general, must be based on a well-thought out conceptual and methodological framework. The danger is not so much an expansionary view of benefits but rather extremely imprecise quantification of their magnitude and distribution. Additional research is needed to refine techniques for monetary and nonmonetary valuation of existence values.

Several substantial limitations appear to constrain its applicability to USACE decision making. Most Corps projects, especially smaller environmental restoration projects, do not provide unique opportunities for capturing non-use benefits (Smith 1987). Moreover, the monetary estimates of existence values generated using contingent valuation appear to be least valid or reliable when the environmental good is narrowly rather than broadly construed. Yet, by their very nature, most projects are focused, instead of diffuse, in terms of the range of benefits. As a result, while the use of existence values should not be abandoned, the calculation of existence values seems to be more appropriate for addressing portfolio (i.e., programmatic-level) rather

than site (i.e., project-level) questions about environmental and other public goods confronting the USACE.

REFERENCES

- Brookshire, D.S., L.S. Eubanks and C.F. Sorg (1986) "Existence Values and Normative Economics: Implications for Valuing Water Resources," Water Resources Research 22: 1509-1518.
- Brookshire, D.S., L.S. Eubanks and A. Randall (1983) "Estimating Option Prices and Existence Values for Wildlife Resources," Land Economics 59: 1-15.
- Brookshire, D.S. and T.D. Crocker (1981) "The Advantages of Contingent Valuation Methods for Benefit-Cost Analysis," Public Choice 36: 235-252.
- Carson, R. and P. Navarro (1988) "Fundamental Issues in Natural Resources Damage Assessments," Natural Resources Journal 28: 816-836.
- Clawson, M. and J.L. Knetsch (1966) Economics of Outdoor Recreation (Baltimore, MD: Johns Hopkins University Press).
- Cory, D.C. and B.C. Saliba (1987) "Requiem for Option Value," Land Economics 63: 1-10.
- Cummings, R.G., D.S. Brookshire and W.D. Schulze (1986) Valuing Public Goods (Totowa, NJ: Rowman and Allanheld).
- Daniel, R.M. (1992) "Use of Existence Values in Corps Feasibility Reports," Memorandum for CEWRC-WLR (7 February).
- Daubert, J.T. and R. Young (1981) "Recreational Demands for Maintaining in Stream Flows: A Contingent Valuation Approach," American Journal of Agricultural Economics 63: 666-675.
- Desvousges, W.H., V.K. Smith and A. Fisher (1987) "Option Price Estimates for Water Quality Improvements: A Contingent Valuation Study for the Monogahela River," Journal of Environmental Economics and Management 14: 248-267.
- Fisher, A. and R. Raucher (1984) "Intrinsic Benefits of Improved Water Quality: Conceptual and Empirical Perspectives," Advances in Applied Micro-Economics 3: 37-66.
- Johannson, P.-O. (1987) The Economic Theory and Measurement of Environmental Benefits (New York: Cambridge University Press).
- Kopp, R.J. (1992) "Why Existence Values Should Be Used in Cost-Benefit Analysis," Journal of Policy Analysis and Management 11: 123-130.

- Krutilla, J.V. (1967) "Conservation Reconsidered," American Economics Review 57: 777-786.
- Krutilla, J.V. and A.C. Fisher (1975) The Economics of Natural Environments (Baltimore, MD: Johns Hopkins University Press).
- Loomis, J. (1988) "Broadening the Concept and Measurement of Existence Value," Northeastern Journal of Agricultural Economics 17: 23-29.
- Madariaga, B. and K.E. McConnell (1987) "Exploring Existence Value," Water Resources Research 23: 936-942.
- Mishan, E.J. (1982) Cost-Benefit Analysis 3rd ed. (Boston: Allen and Unwin).
- Mitchell, R.C. and R.T. Carson (1989) Using Surveys to Value Public Goods (Washington: Resources for the Future).
- Nelson, B.G. (1991) Toward Unity Among Environmentalists (New York: Oxford University Press).
- Regens, J.L. (1991) "Measuring Environmental Benefits with Contingent Markets," Public Administration Review 51: 345-352.
- Rosen, S. (1974) "Hedonic Prices and Implicit Market: Product Differentiation in Pure Competition," Journal of Political Economy 82: 34-55.
- Rosenthal, D.H. and R.H. Nelson (1992) "Why Existence Values Should Not Be Used in Cost-Benefit Analysis," Journal of Policy Analysis and Management 11: 116-122.
- Rowe, R.D. and L.G. Chestnut (1983) "Valuing Environmental Commodities Revisited," Land Economics 59: 404-410.
- Smith, V.K. (1987) "Nonuse Values in Benefit Cost Analysis," Southern Economic Journal 51: 19-26.
- Weisbrod, B.A. (1964) "Collective-Consumption Services of Individual-Consumption Goods," Quarterly Journal of Economics 77: 470-477.